

Dust Mitigation Strategies for High Pressure Oxygen QDs, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

As human spaceflight once again moves toward planetary exploration, space suit hardware must be ready to face the harsh environmental conditions of these surfaces. This is especially true for High Pressure Oxygen Quick Disconnects. These systems are critical life support items that enable the flow of breathing gas, water, and electrical & communication signals from the suit to the vehicle or habitat. Lunar and Martian dust and regolith can have a detrimental effect ranging from an annoyance during mate & demate, to a severe hazard through contamination of the breathing gas lines. The work proposed in this effort will focus on dust mitigation strategies that can be used in a variety of High Pressure Oxygen Quick Disconnects. As a test bed for this effort, Air-Lock will focus on the existing connector designs of the EMU SCU/DCM Multiple Connectors, and the CSSS T-Handle Multiple Connector. However, the task will determine dust mitigation strategies that will be extensible to any existing or future connector design. The first step in this process is identifying the effects that dust and regolith will have. The next step will be a multifaceted approach, we will look to mitigate dust through 1) material and coating technologies 2) mechanical design features such as purges, wipers, and dust seals 3) connector covering and shielding. After a variety of dust mitigation options are developed, the third step in this process will be implementation of the strategies into the connector designs. The final step in this process will be testing of the strategies through samples and mock-ups in a simulated dirty environment.

ANTICIPATED BENEFITS

To NASA funded missions:

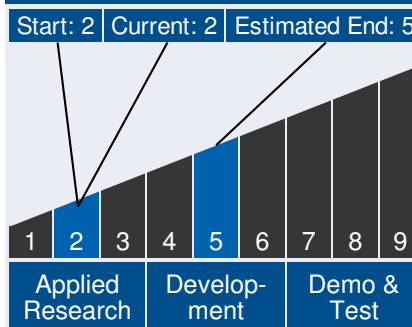
Potential NASA Commercial Applications: Air-Lock's core business focuses on providing life support hardware to enhance human performance in hazardous environments. The dust mitigation strategies learned through this effort will be leveraged



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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on all planetary exploration hardware moving forward. While the focus of this task is on the High Pressure Oxygen Quick Disconnects that enable the flow of breathing gas, water, and electrical & communication signals from the suit to the vehicle or habitat, the dust mitigation strategies can be leveraged for other types of connectors and hardware as well. The knowledge and design techniques learned through these efforts will be used in support of all existing and future suit efforts including the current space suit program of record (EMU) and future programs (OCSS and AES) to market the dust mitigation strategies.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Along with servicing the space industry, Air-Lock provides this life support hardware to the aerospace, military and fire fighter industries. Similar to our spacesuit products, contamination control is always a consideration. The knowledge and design techniques learned through these efforts will be used in support Air-Lock's various hardware designs where applicable.

Management Team *(cont.)*

Principal Investigator:

- Brian Battisti

Technology Areas

Primary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

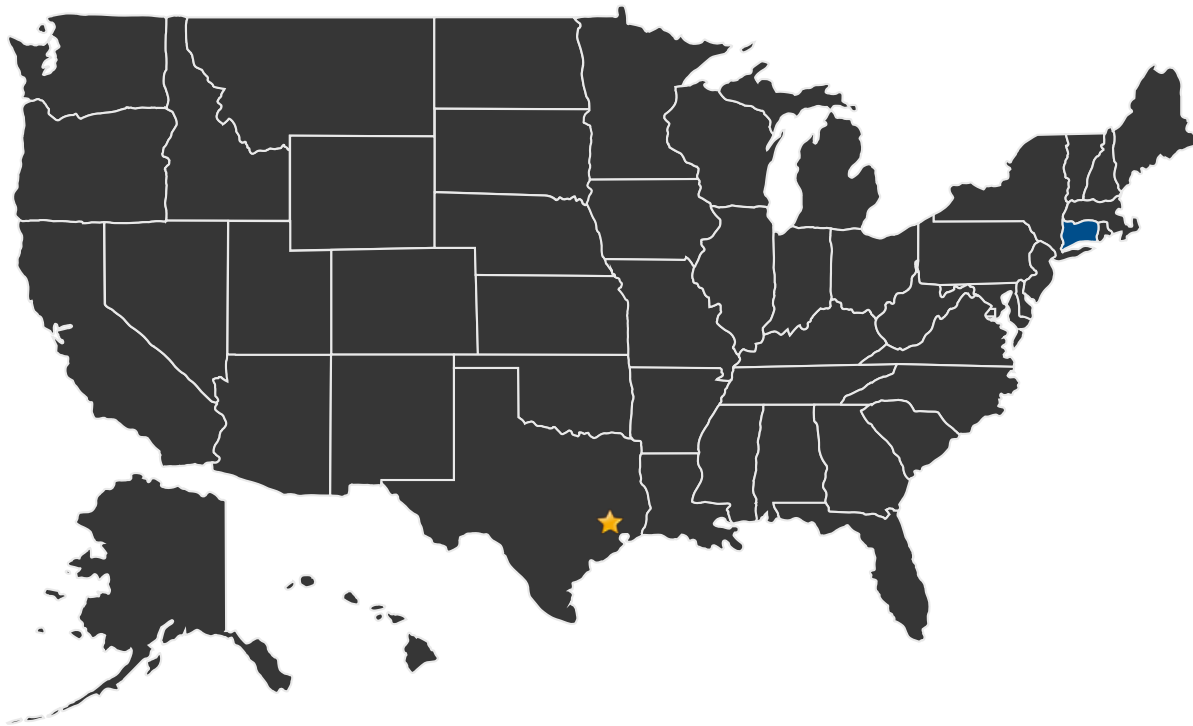
- └ Extravehicular Activity Systems (TA 6.2)
 - └ Portable Life Support System (TA 6.2.2)

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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States With Work ★ **Lead Center:**
Johnson Space Center

Other Organizations Performing Work:

- Air-Lock, Inc. (Milford, CT)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23304>)

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IMAGE GALLERY



*Dust Mitigation Strategies for High
Pressure Oxygen QDs, Phase I*

DETAILS FOR TECHNOLOGY 1

Technology Title

Dust Mitigation Strategies for High Pressure Oxygen QDs, Phase I

Potential Applications

Air-Lock's core business focuses on providing life support hardware to enhance human performance in hazardous environments. The dust mitigation strategies learned through this effort will be leveraged on all planetary exploration hardware moving forward. While the focus of this task is on the High Pressure Oxygen Quick Disconnects that enable the flow of breathing gas, water, and electrical & communication signals from the suit to the vehicle or habitat, the dust mitigation strategies can be leveraged for other types of connectors and hardware as well. The knowledge and design techniques learned through these efforts will be used in support of all existing and future suit efforts including the current space suit program of record (EMU) and future programs (OCSS and AES) to market the dust mitigation strategies.